ecology and environment, inc.
Member of WSP

333 SW Fifth Avenue, Suite 600
Portland, OR 97204
Tel: (503) 248-5600 Fax: (503) 345-6821

MEMORANDUM

Date: November 12, 2020

To: Linda Ader, START-IV Team Leader, E & E, a member of WSP, Seattle, WA LEA

From: Kathryn White, Fisheries Biologist, E & E, a member of WSP, Portland, OR KW

Subject: Bradford Island Landfill Sensitive Environments
Cascade Locks, Oregon

Ref: Contract Number: EP-S7-13-07
Task Order: 68HE0720F0023

This memorandum provides sensitive environment information for Bradford Island Landfill located on Bradford Island within the Columbia River and near Cascade Locks, Oregon. Specifically, this memorandum addresses such occurrences within the 15-mile Target Distance Limit (TDL) within the Columbia River and/or within the documented Zone of Actual Contamination on the northern side of Bradford Island, as depicted in attached Figures 6 and 5, respectively, from the Hazard Ranking System Documentation Record associated with this project.

Five fish species, Bull trout (*Salvelinus confluentus),* Chum salmon (*Oncorhynchus keta),* Steelhead salmon (*Oncorhynchus mykiss),* Coho salmon (*Oncorhynchus kisutch),* and Chinook salmon (*Oncorhynchus tshawytscha)* are federally listed under Endangered Species Act (ESA) as threatened and occur within the 15-mile Target Distance Limit (TDL) on the Columbia River (NMFS 2016). Two fish species, White sturgeon (*Acipenser transmontanus*) and Sockeye salmon (*Oncorhynchus nerka)* are federally listed under ESA as endangered and occur within the 15-mile TDL. The Columbia River within the 15-mile TDL is a major migratory pathway and contains critical spawning habitat required for population maintenance for summer and spring Steelhead salmon, fall and spring Chinook salmon, and Coho salmon. A critical migratory pathway for Bull trout, Sockeye salmon, summer Chinook, and fall Chum is expected to exist within the Zone of Actual Contamination as these species migrate to and/or from critical spawning habitats. White Sturgeon and Rainbow trout (a life stage of Steelhead salmon) are both resident fish species and have multiple uses within the Zone of Actual Contamination.

Steelhead have the most complex life history of any species of Pacific salmon. Steelhead can be freshwater residents (referred to as 'rainbow trout') or anadromous (referred to as 'steelhead'). Many State and Federal departments use both 'Rainbow trout' and 'Steelhead salmon' when collecting data. Both resident and anadromous forms of Steelhead may repeatedly spawn, compared to other Pacific salmon that spawn then die (Satterthwaite et al. 2009). Thorpe (2007) identified 32 potential life history trajectories for steelhead. This presents further management challenges with Steelhead salmon.

The National Marine Fisheries Service monitored and distinguished the Evolutionary Significant Unit (ESUs) and Distinct Population Segment (DPSs) for Pacific salmon and steelhead in the late 1990s (Ford 2011). The habitat known as the Lower Columbia River within the 15-mile TDL is the designated critical habitat and the ESU for Chinook salmon, Chum salmon, Coho salmon, and Steelhead (NMFS 2016). The ESA listing units and the endangered and threatened species found within the 15-mile TDL and Zone of

Actual Contamination are listed in Tables 1 and 2 (ODFW Compass; Washington Geospatial Open Data Portal).

Table 1
Endangered Species Act (ESA) Listing Units Presence

ESA Listing Units	Present within Zone of Actual Contamination (Y/N)	Present within 15-mile Target Distance Limit (Y/N)
Spring Chinook ESU	Y	Y
Summer Chinook ESU	Y	Y
Fall Chinook ESU	Y	Y
Fall Chum ESU	Y	Y
Winter Chum ESU	Y	Y
Coho ESU	Y	Y
Winter Steelhead DPS	Y	Y
Summer Steelhead DPS	Y	Y

Table 2
Sensitive Environments

Common Name, Scientific Name, and Population	Federal Status	State Status	Designated Critical Habitat (Y/N)	Present within Zone of Actual Contamination (Y/N)	Present within 15-mile Target Distance Limit (Y/N)	Distribution and Life History	Reference
Bull trout *(Salvelinus confluentus)*	Threatened	Candidate (Washington)	Y	Y	Y	Documented presence, migration, and overwintering throughout TDL	ODFW n.d.; WDFW n.d.
Chum salmon *(Oncorhynchus keta)* Lower Columbia River ESU	Threatened	Candidate (Washington)	Y	Y	Y	Documented and historic presence, migration, and spawning throughout TDL, two potential blocked streams below dam	ODFW n.d.; WDFW n.d.; NMFS 2016
Steelhead salmon *(Oncorhynchus mykiss)* Lower Columbia River ESU	Threatened	Candidate (Washington)	Y	Y	Y	Documented and historical presence, spawning, rearing, migration, and resident with multiple uses throughout TDL	ODFW n.d.; WDFW n.d.; NMFS 2016
Coho salmon *(Oncorhynchus kisutch)* Lower Columbia River ESU	Threatened	Endangered (Oregon)	Y	Y	Y	Documented. presumed, and historic presence, spawning, and rearing throughout TDL, four potential blocked streams below dam	ODFW n.d.; WDFW n.d; NMFS 2016

Table 2
Sensitive Environments

Common Name, Scientific Name, and Population	Federal Status	State Status	Designated Critical Habitat (Y/N)	Present within Zone of Actual Contamination (Y/N)	Present within 15-mile Target Distance Limit (Y/N)	Distribution and Life History	Reference
Chinook salmon (*Oncorhynchus tshawytscha)* Lower Columbia River ESU	Threatened	Candidate (Washington)	Y	Y	Y	Documented and historical presence, migration, spawning, and rearing throughout TDL, one potentially blocked stream below dam	ODFW n.d.; WDFW n.d.; NMFS 2016
White Sturgeon (*Acipenser transmontanus*)	Endangered	Candidate (Washington)	N	Y	Y	Spawning and resident with multiple uses throughout TDL, resident with multiple uses above dam	USFWS n.d.; ODFW n.d.
Sockeye salmon (*Oncorhynchus nerka)*	Endangered	Candidate (Washington)	Y	Y	Y	Documented and historical presence throughout TDL	ODFW n.d.; WDFW n.d.

Key:

TDL – Target Distance Limit.

Reference List:

U.S. Fish and Wildlife Service (USFWS). n.d. *Endangered Species*. Available at: https://www.fws.gov/endangered/. Accessed March 4, 2020.

Ford, M.J. (ed.). 2011. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service. *Status Review Update for Pacific Salmon and Steelhead Listed under the Endangered Species Act: Pacific Northwest*., NOAA Technical Memorandum, NMFS-NWFSC-113. November 2011. 307 total pages, 20 pages excerpted inclusive of the Table of Contents and pages 8 and 9.

National Marine Fisheries Service (NMFS). 2016. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, West Coast Region, Portland, Oregon. *2016 5-Year Review: Summary & Evaluation of Lower Columbia River Chinook Salmon, Columbia River Chum Salmon, Lower Columbia River Coho Salmon, Lower Columbia River Steelhead.* 87 total pages, 11 pages excerpted inclusive of the Table of Contents and pages 1 through 5.

Oregon Department of Fish and Wildlife (ODFW). n.d. *Threatened, Endangered, and Candidate Fish and Wildlife Species*. Available at: https://www.dfw.state.or.us/wildlife/diversity/species/threatened_endangered_candidate_list.asp. Accessed March 4, 2020.

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Satterthwaite, W.H., M.P. Beakes, E.M. Collins, D.R. Swank, J.E. Merz, R.G. Titus, S.M. Sogard, and M. Mangel. 2009. *Steelhead Life History on California's Central Coast: Insights from a State-Dependent Model*. Article in: Transactions of the American Fisheries Society. May 2009. Volume 138. 18 pages.

Thorpe, J. E. 2007. *Maturation responses of salmonids to changing developmental opportunities*. Article in: Marine Ecology Progress Series. April 16, 2007. Volume 335. 4 pages.

Washington Department of Fish and Wildlife (WDFW). n.d. *Threatened and Endangered Species*. Available at: https://wdfw.wa.gov/species-habitats/at-risk/listed. Accessed March 4, 2020.

Washington Geospatial Open Data Portal. n.d. *SalmonScape*. Available at: http://geo.wa.gov/datasets/1e56a648718543ab952e75ff9971f086. Accessed March 4, 2020.

FIGURES

Key:

- Zone of Actual Contamination
- Surface Water Drainage Direction
- Catch Basins and Drain Lines
- Landfill AOPC
- Bulb Slope AOPC
- Spent Sandblast Grit Disposal Area

Sampling Stations

- Pre-FS Sediment and Clam (2011)
- RI Sediment and Clam (2008)
- Pre-FS Smallmouth Bass (2011)

Notes:

The following items were removed from the base map by Ecology and Environment, Inc. (member of WSP):

- Pre-RI Sediment (2007) symbols and labels,
- RI Sculpin Composite (2008) symbols and labels, and
- RI Smallmouth Bass (2006) symbols and labels.

The following items were added to the base map by Ecology and Environment, Inc. (member of WSP):

- Zone of Actual Contamination lines and shading,
- Former Debris Piles #1, #2, and #3 (Ref. 4, p. 302),
- Surface Water Drainage Direction Lines (Ref. 4, p. 303),
- Catch basins and outfalls (Ref. 4, pp. 301 and 303), and
- Landfill AOPC, Spent Sandblast Grit Disposal Area, Equipment Laydown Area, and Bulb Slope AOPC source locations (Ref. 4, pp. 297, 301, 302, and 303).

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Source:
Ref. 7, p. 212.

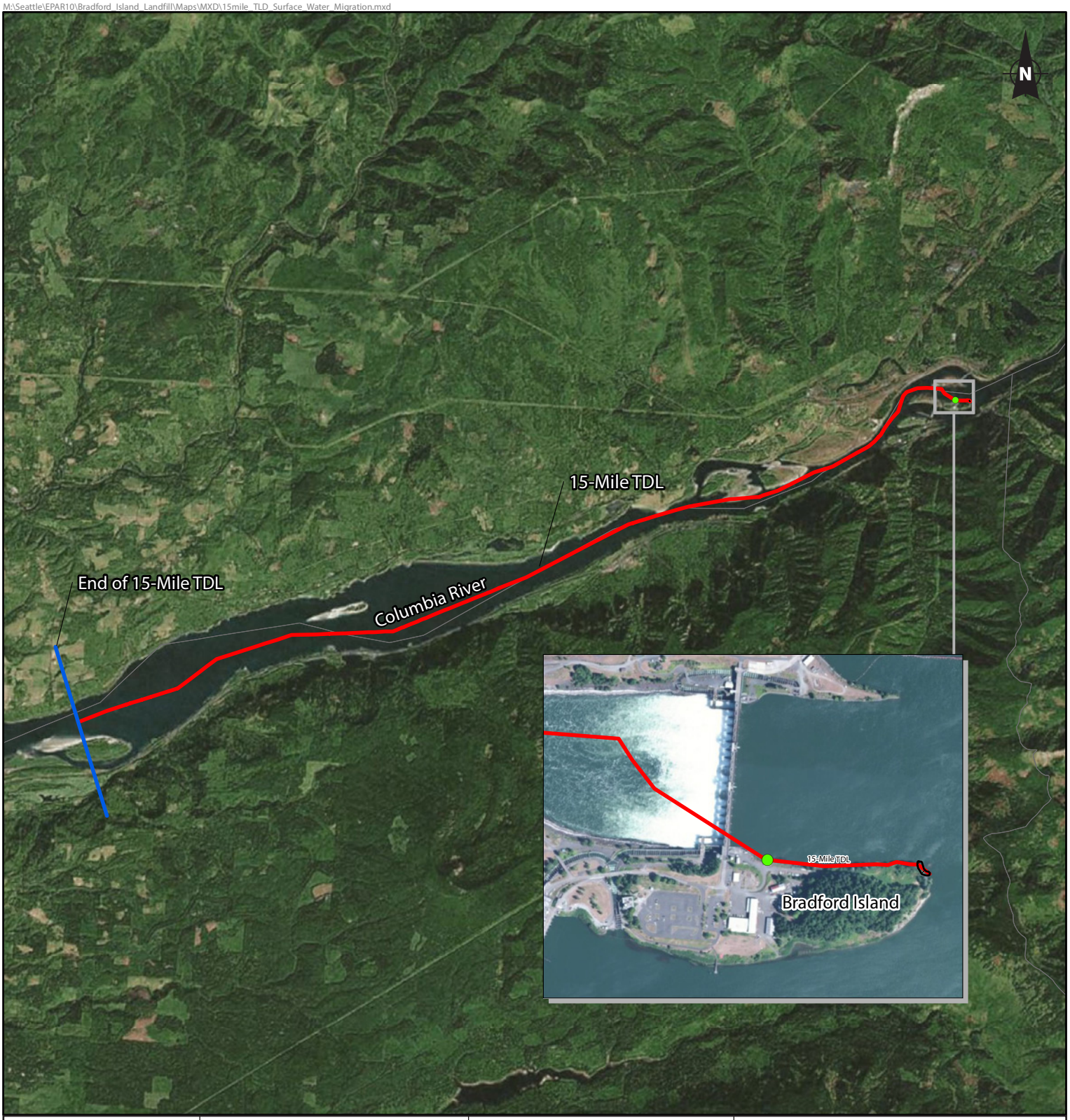
BRADFORD ISLAND LANDFILL
Cascade Locks, Oregon

0 125 250
Approximate Scale in Feet

Figure 5
Zone of Actual Contamination and Sediment and Tissue Sample Locations

Date:	Drawn by:	
2-7-20	SB	1004530.F230.001.01\Fig6

M:\Seattle\EPAR10\Bradford_Island_Landfill\Maps\MXD\15mile_TLD_Surface_Water_Migration.mxd



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KEY:

- Outfall #2 (Ref. 15, p.6)
- 15-Mile TDL
- End of 15-Mile TDL
- Debris Pile #1 (Ref. 15, p.6)
- **TDL** Target Distance Limit

BRADFORD ISLAND LANDFILL
Cascade Locks, Oregon

0 1 2
Miles

Figure 6
Surface Water Migration Pathway
15-Mile Target Distance Limit

Date:	Drawn by:	
2-4-20	AGM	1004530.F230.001.01\Fig6

Note: Feature labels, TDL-related lines, Outfall #2, and Debris Pile #1 added to basemap by Ecology and Environment, Inc., a member of WSP

REFERENCES

NOAA Technical Memorandum NMFS-NWFSC-113

Status Review Update for Pacific Salmon and Steelhead Listed under the Endangered Species Act: Pacific Northwest

November 2011

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service

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Reference throughout this document to trade names does not imply endorsement by the National Marine Fisheries Service, NOAA.

This document should be referenced as follows:

M.J. Ford (ed.). 2011. Status review update for Pacific salmon and steelhead listed under the Endangered Species Act: Pacific Northwest. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-113, 281 p.

NOAA Technical Memorandum NMFS-NWFSC-113

Status Review Update for Pacific Salmon and Steelhead Listed under the Endangered Species Act: Pacific Northwest

Edited by Michael J. Ford

From contributions by the editor and Andrew Albaugh, Katie Barnas, Tom Cooney, Jeff Cowen, Jeffrey J. Hard, Robert G. Kope, Michelle M. McClure, Paul McElhany, James M. Myers, Norma J. Sands, David Teel, and Laurie A. Weitkamp

Northwest Fisheries Science Center
2725 Montlake Boulevard East
Seattle, Washington 98112

November 2011

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service

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body size and morphology, and reproductive traits (i.e., egg size). Population genetic structure can be very informative for estimating the degree of reproductive isolation among populations. Similarly, mark/recapture studies provide information on the level of interpopulation migration, although straying does not necessarily result in successful introgression.

Habitat and ecological information has been extensively used to establish ESU and DPS boundaries, especially where there is little population specific information available. Given the high level of homing fidelity exhibited by salmonids and the associated degree of local adaptation in life history traits, habitat characteristics become a useful proxy for putative differences in life history traits. Similarly, biogeographic boundaries and the distribution and ESU structure of similar species have been used where information on the species in question is lacking.

In initially defining the structure of ESUs and DPSs, the BRTs analyzed a variety of different data types of varying quality. At the time, the BRTs recognized that ESU boundaries would not necessarily be discrete, rather a transitional zone covering one or more basins might exist at the interface between putative ESUs. In some cases, especially where there was not a geographic feature to rely on, there was some degree of uncertainty in the identification of ESU boundaries. Population-specific information was frequently limited and in some cases natural populations in the transitional zone had been extirpated or modified by the transfer of fish between basins. Ultimately, the BRTs have used the best available information to assign transitional populations into ESUs/DPSs with the understanding that, if additional information became available, the decisions regarding the boundaries could be revisited.

New Information

The majority of the ESUs and DPSs for Pacific salmon and steelhead were initially defined in the late 1990s as part of the coast-wide status review process undertaken by the NMFS. In the intervening 15 years, the most marked change in population monitoring has arguably been in the analysis of genetic variation. Initially, the majority of the genetics information was developed using starch-gel electrophoresis of allozymes. The utilization of DNA microsatellite technology in fisheries during the last 10 years has provided a wealth of additional genetic information. Overall, this technique has provided a finer level of discrimination than was possible with allozymes. Furthermore, since the initial listings there have been extensive monitoring efforts throughout the West Coast. Thus the quality and quantity of genetic information available to address the issue of ESU and DPS delineation has improved considerably.

For a number of populations, monitoring efforts over the last 15 years have expanded the existing databases on abundance, spawn timing, and migratory patterns. Additionally, the mass marking of hatchery-origin juveniles has improved the quality of the data collected, especially regarding the life history data of naturally produced fish.

Information of all types, from published and unpublished sources, was reviewed in order to assess whether sufficient data existed to justify a reconsideration of the ESU boundary. Much of the relevant information had already been summarized by the TRTs in their identification of populations within listed ESUs and DPSs (Table 3). This review will not explicitly discuss all of

Table 3. TRT reports on population structure within listed Pacific Northwest ESUs and distinct population segments. See http://www.nwfsc.noaa.gov/trt/pubs.cfm for copies of these reports.

Domain	Population structure document name	Year completed
Puget Sound Chinook	Independent populations of Chinook salmon in Puget Sound	2006
Puget Sound, Hood canal summer chum	Determination of independent populations and viability criteria for the Hood Canal summer chum salmon ESU	2009
Puget Sound, Lake Ozette sockeye	Identification of an independent population of sockeye salmon in Lake Ozette, Washington	2009
Willamette and Lower Columbia	Historical population structure of Pacific salmonids in the Willamette River and lower Columbia River basins	2006
Oregon coast	Identification of historical populations of coho salmon in the Oregon coast ESU	2007
Interior Columbia basin	Independent populations of Chinook, steelhead, and sockeye for listed ESUs within the interior Columbia River domain	2003

the information that was considered, but rather focuses on information pertaining to ESUs and DPSs that would potentially justify further investigation regarding changes in boundaries.

Coho Salmon—Puget Sound and Washington Coast ESUs

ESUs for West Coast coho salmon were originally delineated in 1995 (Weitkamp et al. 1995). At that time, six ESUs were identified: 1) central California coast, 2) northern California/southern Oregon coasts, 3) Oregon coast, 4) Columbia River/southwest Washington, 5) Olympic Peninsula, and 6) Puget Sound/Strait of Georgia (Figure 1). In 2005 NMFS determined that the Columbia River/Southwest Washington ESU should be split and the Columbia River portion was listed under the ESA, leaving the status of southwest Washington coho salmon populations in question.

Since the original status review, new genetic and life history information has become available that provides further insight into how coho salmon are likely adapted to habitats throughout their range, resulting in reproductive isolation and phenotypic variation. This new information has yet to be considered for those coho salmon ESUs, which have not been evaluated since the original status review. Accordingly, this analysis will focus on coho salmon populations that occupy freshwater habitats along the Washington coast, Strait of Juan de Fuca, Puget Sound, and southern British Columbia. Possible changes to ESU boundaries have previously been considered for coho salmon from northern California and Oregon and were found to be consistent with the best scientific information (Stout et al. in press) and therefore will not be discussed here.

Science, Service, Stewardship

2016 5-Year Review: Summary & Evaluation of Lower Columbia River Chinook Salmon Columbia River Chum Salmon Lower Columbia River Coho Salmon Lower Columbia River Steelhead

National Marine Fisheries Service
West Coast Region
Portland, OR

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5-Year Review: Lower Columbia River Species

Species Reviewed	Evolutionarily Significant Unit or Distinct Population Segment
Chinook Salmon (*Oncorhynchus tshawytscha*)	*Lower Columbia River Chinook Salmon*
Chum Salmon (*O. keta*)	*Columbia River Chum Salmon*
Coho Salmon (*O. kisutch*)	*Lower Columbia River Coho Salmon*
Steelhead (*O. mykiss*)	*Lower Columbia River Steelhead*

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1 · General Information

1.1 Introduction

Many West Coast salmon and steelhead (*Oncorhynchus* sp.) stocks have declined substantially from their historic numbers and now are at a fraction of their historical abundance. There are several factors that contribute to these declines, including: overfishing, loss of freshwater and estuarine habitat, hydropower development, poor ocean conditions, and hatchery practices. These factors collectively led to the National Marine Fisheries Service's (NMFS) listing of 28 salmon and steelhead stocks in California, Idaho, Oregon, and Washington under the Federal Endangered Species Act (ESA).

The ESA, under section 4(c)(2), directs the Secretary of Commerce to review the listing classification of threatened and endangered species at least once every five years. After completing this review, the Secretary must determine if any species should be: (1) removed from the list; (2) have its status changed from threatened to endangered; or (3) have its status changed from endangered to threatened. The most recent listing determinations for most salmon and steelhead occurred in 2005 and 2006. This document describes the results of the agency's five-year status review for ESA-listed lower Columbia River salmon and steelhead species. These include: Lower Columbia River Chinook salmon, Columbia River chum salmon, Lower Columbia River coho salmon, and Lower Columbia River steelhead.

1.1.1 Background on listing determinations

The ESA defines species to include subspecies and distinct population segments (DPS) of vertebrate species. A species may be listed as threatened or endangered. To identify distinct population segments of salmon species we apply the "Policy on Applying the Definition of Species under the ESA to Pacific Salmon" (56 FR 58612). Under this policy we identify population groups that are "evolutionarily significant units" (ESU) within their species. We consider a group of populations to be an ESU if it is substantially reproductively isolated from other populations, and represents an important component in the evolutionary legacy of the biological species. We consider an ESU as constituting a DPS and therefore a "species" under the ESA.

To identify DPSs of steelhead, we apply the joint U.S. Fish and Wildlife Service-National Marine Fisheries Service DPS policy (61 FR 4722) rather than the ESU policy. Under this policy, a DPS of steelhead must be discrete from other populations, and it must be significant to its taxon.

Artificial propagation programs (hatcheries) are common throughout the range of ESA-listed West Coast salmon and steelhead. Prior to 2005, our policy was to include in the listed ESU or DPS only those hatchery fish deemed "essential for conservation" of the species. We revised that approach in response to a court decision and on June 28, 2005, announced a final policy

addressing the role of artificially propagated Pacific salmon and steelhead in listing determinations under the ESA (70 FR 37204) (hatchery listing policy). This policy establishes criteria for including hatchery stocks in ESUs and DPSs. In addition, it (1) provides direction for considering hatchery fish in extinction risk assessments of ESUs and DPSs; (2) requires that hatchery fish determined to be part of an ESU or DPS be included in any listing of the ESU or DPS; (3) affirms our commitment to conserving natural salmon and steelhead populations and the ecosystems upon which they depend; and (4) affirms our commitment to fulfilling trust and treaty obligations with regard to the harvest of some Pacific salmon and steelhead populations, consistent with the conservation and recovery of listed salmon ESUs and steelhead DPSs.

To determine whether a hatchery program is part of an ESU or DPS, and therefore must be included in the listing, we consider the origins of the hatchery stock, where the hatchery fish are released, and the extent to which the hatchery stock has diverged genetically from the donor stock. We include within the ESU or DPS (and therefore within the listing) hatchery fish that are no more than moderately diverged from the local population.

Because the new hatchery listing policy changed the way we considered hatchery fish in ESA listing determinations, we completed new status reviews and ESA listing determinations for West Coast salmon ESUs on June 28, 2005 (70 FR 37160), and for steelhead DPSs on January 5, 2006 (71 FR 834). On August 15, 2011, we published our status reviews and listing determinations for 11 ESUs of Pacific salmon and 6 DPSs of steelhead from the Pacific Northwest (76 FR 50448).

1.2 Methodology used to complete the review

On February 6, 2015, we announced the initiation of five year reviews for 17 ESUs of salmon and 11 DPSs of steelhead in Oregon, California, Idaho, and Washington (80 FR 6695). We requested that the public submit new information on these species that has become available since our original listing determinations or since the species' status was last updated. In response to our request, we received information from Federal and state agencies, Native American Tribes, conservation groups, fishing groups, and individuals. We considered this information, as well as information routinely collected by our agency, to complete these five year reviews.

To complete the reviews, we first asked scientists from our Northwest and Southwest Centers to collect and analyze new information about ESU and DPS viability. To evaluate viability, our scientists used the Viable Salmonid Population (VSP) concept developed by McElhany et al. (2000). The VSP concept evaluates four criteria – abundance, productivity, spatial structure, and diversity – to assess species viability. Through the application of this concept, the science center considered new information for a given ESU or DPS relative to the four salmon and steelhead population viability criteria. They also considered new information on ESU and DPS composition. At the end of this process, the science team prepared reports detailing the results of their analyses (NWFSC 2015).

To further inform the reviews, we also asked salmon management biologists from our West Coast Region familiar with hatchery programs to consider new information available since the previous listing determinations. Among other things, they considered whether any hatchery programs have ended or new hatchery programs have started, any changes in the operation of existing programs, and scientific data relevant to the degree of divergence of hatchery fish from naturally spawning fish in the same area. They produced a report (Jones 2015) describing their findings. Finally, we consulted salmon management biologists from the West Coast Region who are familiar with hatchery programs, habitat conditions, hydropower operations, and harvest management. In a series of structured meetings, by geographic area, these biologists identified relevant information and provided their insights on the degree to which circumstances have changed for each listed entity.

In preparing this report, we considered the best available scientific information, including the work of the Northwest Fisheries Science Center (NWFSC 2015); the report of the regional biologists regarding hatchery programs (Jones 2015); recovery plans for the species in question; technical reports prepared in support of recovery plans for the species in question; the listing record (including designation of critical habitat and adoption of protective regulations); recent biological opinions issued for lower Columbia River salmon and steelhead; information submitted by the public and other government agencies; and the information and views provided by the geographically based management teams. The present report describes the agency's findings based on all of the information considered.

1.3 Background – Summary of Previous Reviews, Statutory and Regulatory Actions, and Recovery Planning

1.3.1 Federal Register Notice announcing initiation of this review

80 FR 6695; February 6, 2015

1.3.2 Listing history

Beginning in 1998, NMFS began listing salmonid species in the lower Columbia River under the ESA. Over the next several years, four species of salmonids in this area were listed as threatened (Table 1).

Table 1. Summary of the listing history under the Endangered Species Act for ESUs and DPS in the lower Columbia River.

Salmonid Species	ESU/DPS Name	Original Listing	Revised Listing(s)
Chinook Salmon (*O. tshawytscha*)	Lower Columbia River Chinook Salmon	**FR Notice:** 64 FR 14308 **Date:** 3/24/1999 **Classification:** Threatened	**FR Notice:** 70 FR 37160 **Date:** 6/28/2005 **Re-classification:** Threatened

Salmonid Species	ESU/DPS Name	Original Listing	Revised Listing(s)
Chum Salmon (*O. keta*)	Columbia River Chum Salmon	**FR Notice:** 64 FR 14508 **Date:** 3/25/1999 **Classification:** Threatened	**FR Notice:** 70 FR 37160 **Date:** 6/28/2005 **Re-classification:** Threatened
Coho Salmon (*O. kisutch*)	Lower Columbia River Coho Salmon	**FR Notice:** 70 FR 37160 **Date:** 6/28/2005 **Classification:** Threatened	NA
Steelhead (*O. mykiss*)	Lower Columbia River Steelhead	**FR Notice:** 63 FR 13347 **Date:** 3/19/1998 **Classification:** Threatened	**FR Notice:** 71 FR 834 **Date:** 1/5/2006 **Re-classification:** Threatened

1.3.3 Associated rulemakings

The ESA requires NMFS to designate critical habitat, to the maximum extent prudent and determinable, for species it lists under the ESA. Critical habitat is defined as: (1) specific areas within the geographical area occupied by the species at the time of listing, if they contain physical or biological features essential to conservation, and those features may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by the species at the time of listing if the agency determines that the area itself is essential for conservation. We designated critical habitat for Lower Columbia River (LCR) Chinook salmon, Columbia River (CR) chum salmon, and LCR steelhead in 2005, and we designated critical habitat for LCR coho salmon in 2016 (Table 2). Section 9 of the ESA prohibits the take of species listed as endangered. The ESA defines take to mean harass, harm, pursue, hunt, shoot, wound, trap, capture, or collect, or attempt to engage in any such conduct. For threatened species, the ESA does not automatically prohibit take, but instead authorizes the agency to adopt regulations it deems necessary and advisable for species conservation including regulations that prohibit take (ESA section 4(d)). In 2000, NMFS adopted 4(d) regulations for threatened salmonids that prohibit take except in specific circumstances. In 2005, we revised our 4(d) regulations for consistency between ESUs and DPSs, and, to take into account our hatchery listing policy.

Table 2. Summary of rulemaking for 4(d) protective regulations and critical habitat for ESUs and DPS in the lower Columbia River.

Salmonid Species	ESU Name	4(d) Protective Regulations	Critical Habitat Designations
Chinook Salmon (*O. tshawytscha*)	Lower Columbia River Chinook Salmon	**FR notice:** 65 FR 42422 **Date:** 7/10/2000 **Revised:** 6/28/2005 (70 FR 37160)	**FR Notice:** 70 FR 52630 **Date:** 9/2/2005
Chum Salmon (*O. keta*)	Columbia River Chum Salmon	**FR notice:** 65 FR 42422 **Date:** 7/10/2000 **Revised:** 6/28/2005 (70 FR 37160)	**FR Notice:** 70 FR 52630 **Date:** 9/2/2005
Coho Salmon (*O. kisutch*)	Lower Columbia River Coho Salmon	**FR Notice:** 70 FR 37160 **Date:** 6/28/2005	**FR Notice:** 81 FR 9252 **Date:** 2/24/2016
Steelhead (*O. mykiss*)	Lower Columbia River Steelhead	**FR notice:** 65 FR 42422 **Date:** 7/10/2000 **Revised:** 6/28/2005 (70 FR 37160)	**FR notice:** 70 FR 52630 **Date:** 9/2/2005

1.3.4 Review History

Table 3 lists the numerous scientific assessments of the status of lower Columbia River salmon ESUs and steelhead DPS. These assessments include status reviews conducted by our Northwest Fisheries Science Center and technical reports prepared in support of recovery planning for this species.

Steelhead Life History on California's Central Coast: Insights from a State-Dependent Model

Article *in* Transactions of the American Fisheries Society · May 2009

DOI: 10.1577/T08-164.1

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[Article]

Steelhead Life History on California's Central Coast: Insights from a State-Dependent Model

WILLIAM H. SATTERTHWAITE*
Center for Stock Assessment Research, Department of Applied Mathematics and Statistics, University of California Santa Cruz, Santa Cruz, California 95064, USA

MICHAEL P. BEAKES
Center for Stock Assessment Research, Department of Applied Mathematics and Statistics, University of California Santa Cruz, Santa Cruz, California 95064, USA; and National Marine Fisheries Service, 110 Shaffer Road, Santa Cruz, California 95060, USA

ERIN M. COLLINS
California Department of Fish and Game, 8175 Alpine Avenue, Suite F, Sacramento, California 95826, USA

DAVID R. SWANK
Center for Stock Assessment Research, Department of Applied Mathematics and Statistics, University of California Santa Cruz, Santa Cruz, California 95064, USA; and National Marine Fisheries Service, 110 Shaffer Road, Santa Cruz, California 95060, USA

JOSEPH E. MERZ
Cramer Fish Sciences, 126 East Street, Auburn, California 95603, USA; and Institute of Marine Sciences, University of California Santa Cruz, Santa Cruz, California 95064, USA

ROBERT G. TITUS
California Department of Fish and Game, 8175 Alpine Avenue, Suite F, Sacramento, California 95826, USA

SUSAN M. SOGARD
National Marine Fisheries Service, 110 Shaffer Road, Santa Cruz, California 95060, USA

MARC MANGEL
Center for Stock Assessment Research, Department of Applied Mathematics and Statistics, University of California Santa Cruz, Santa Cruz, California 95064, USA

* Corresponding author: satterth@darwin.ucsc.edu

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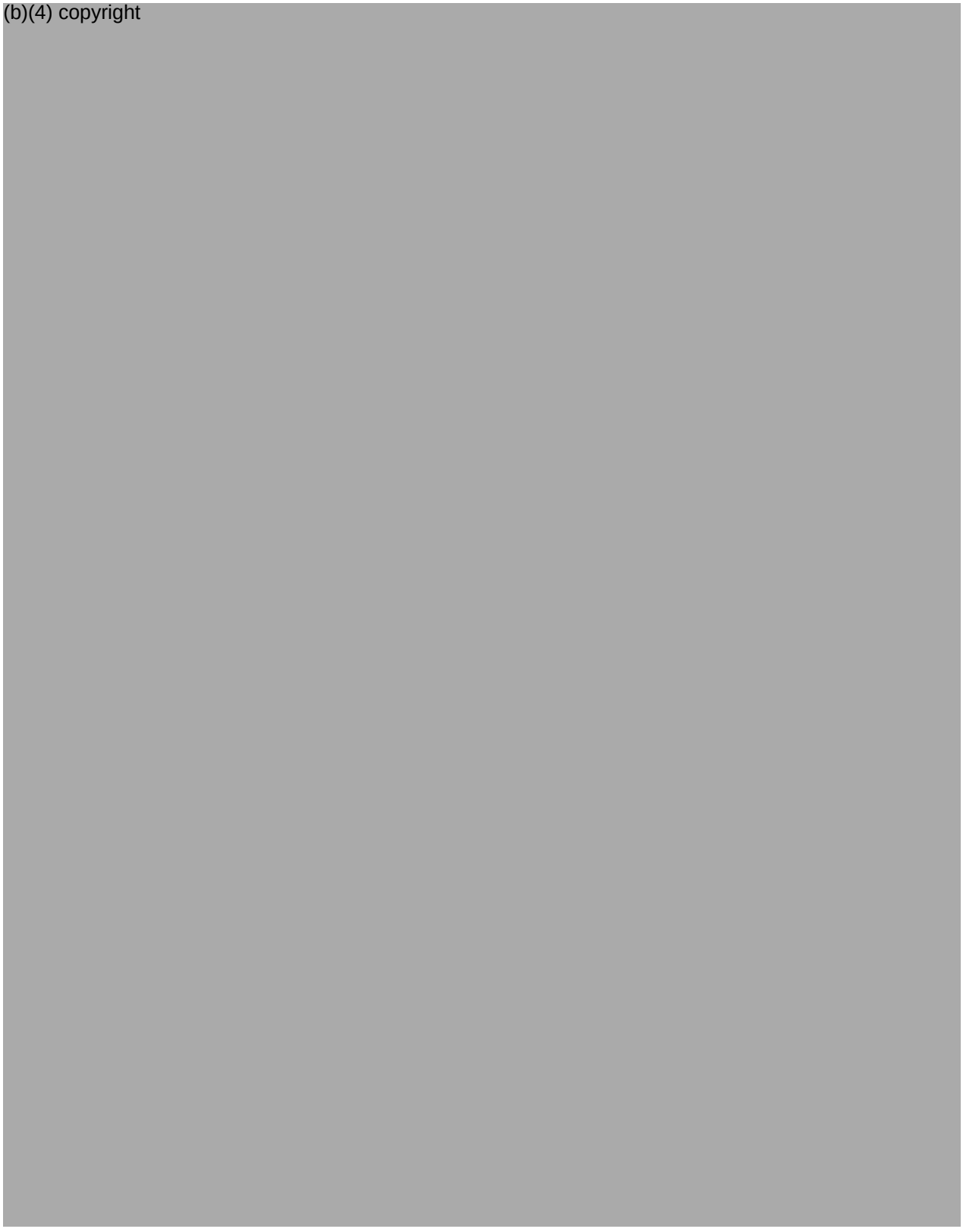
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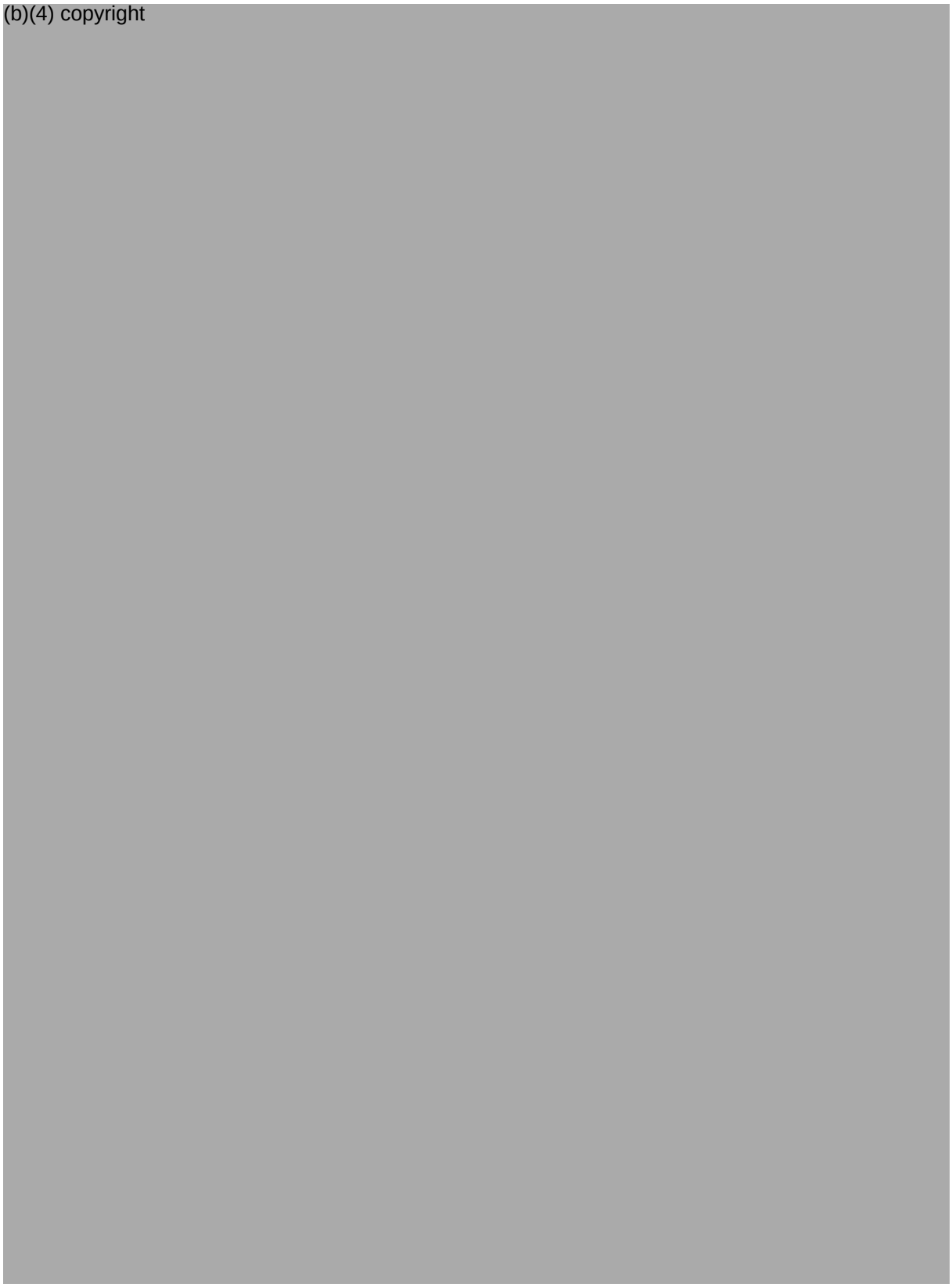
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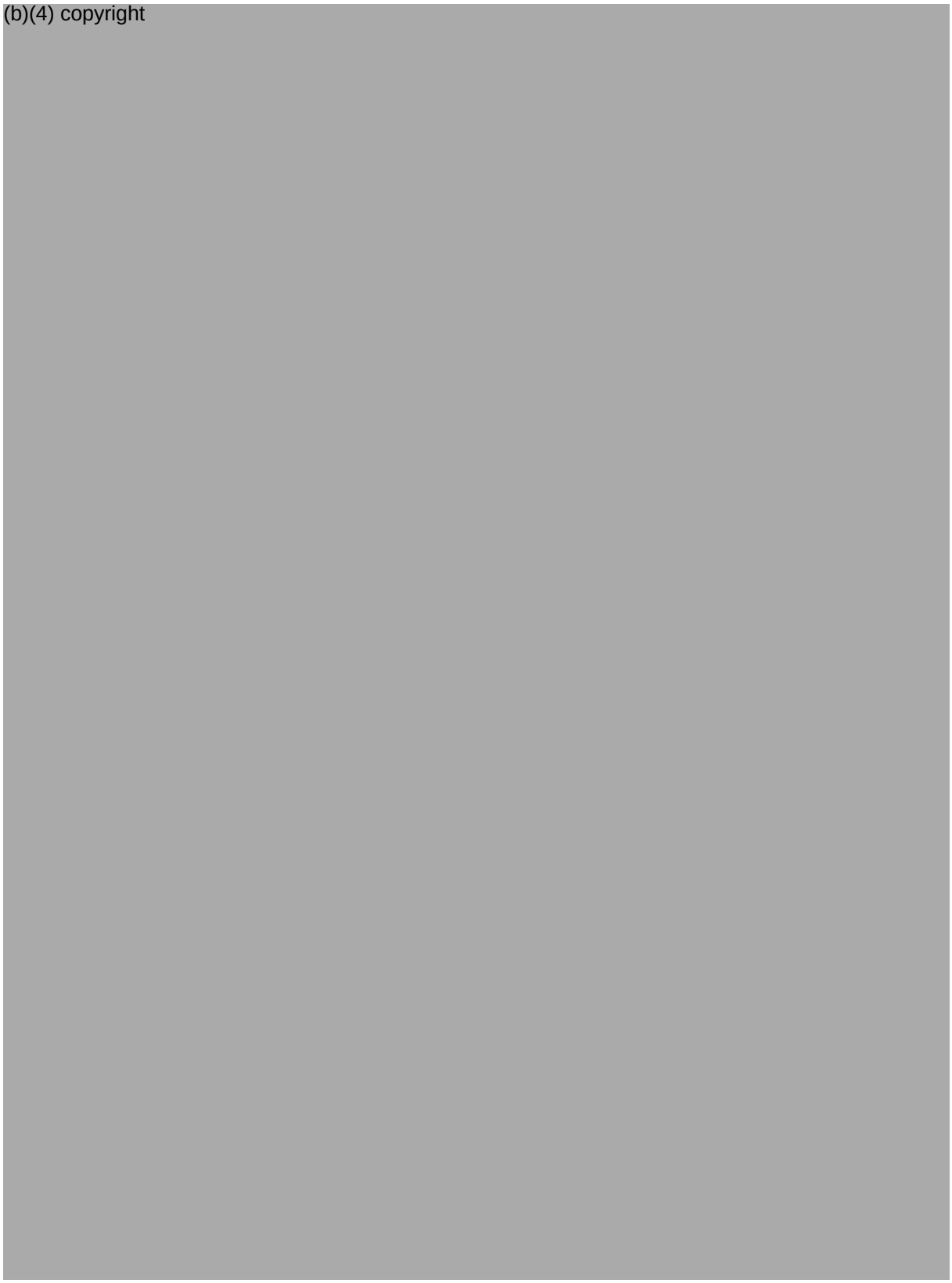
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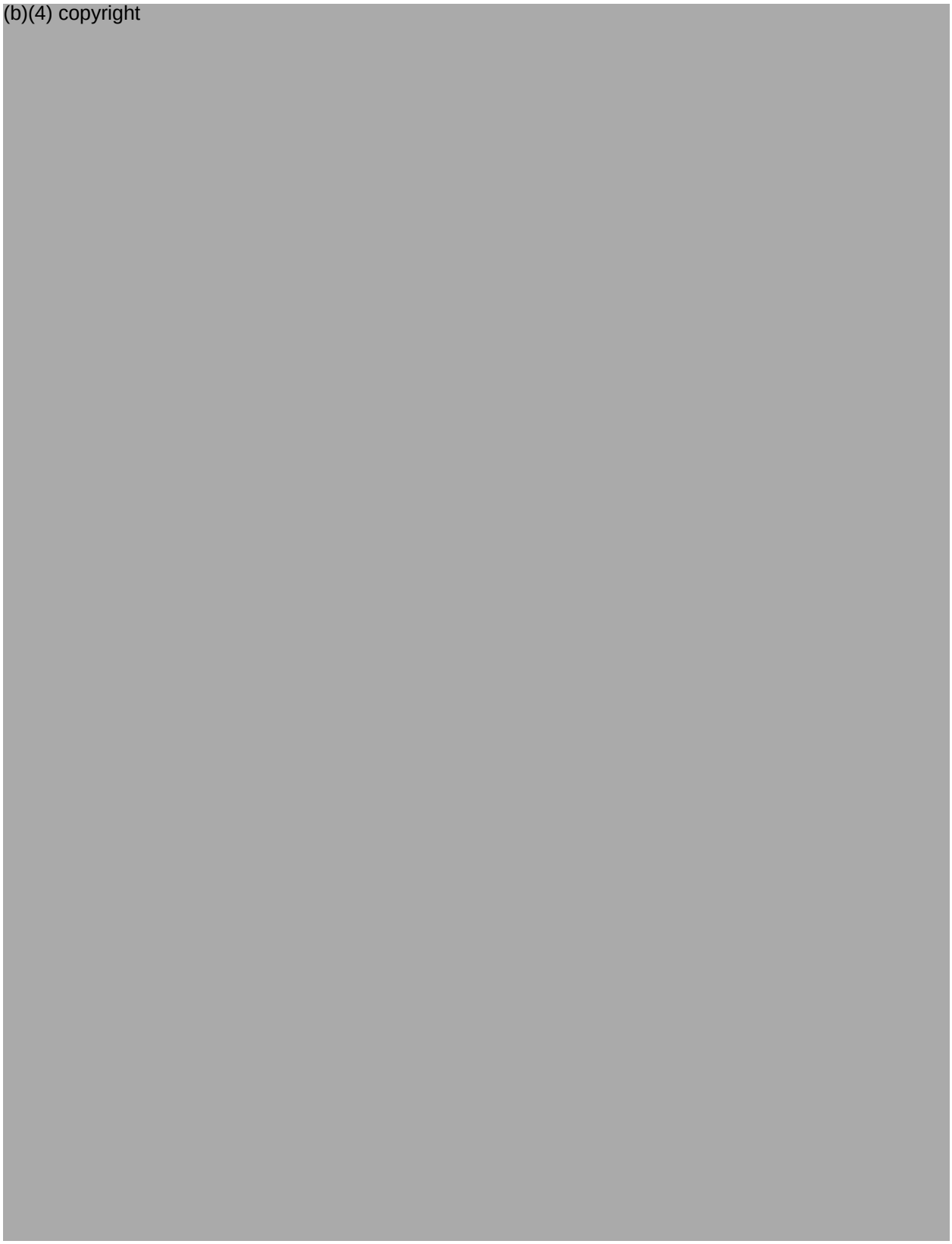
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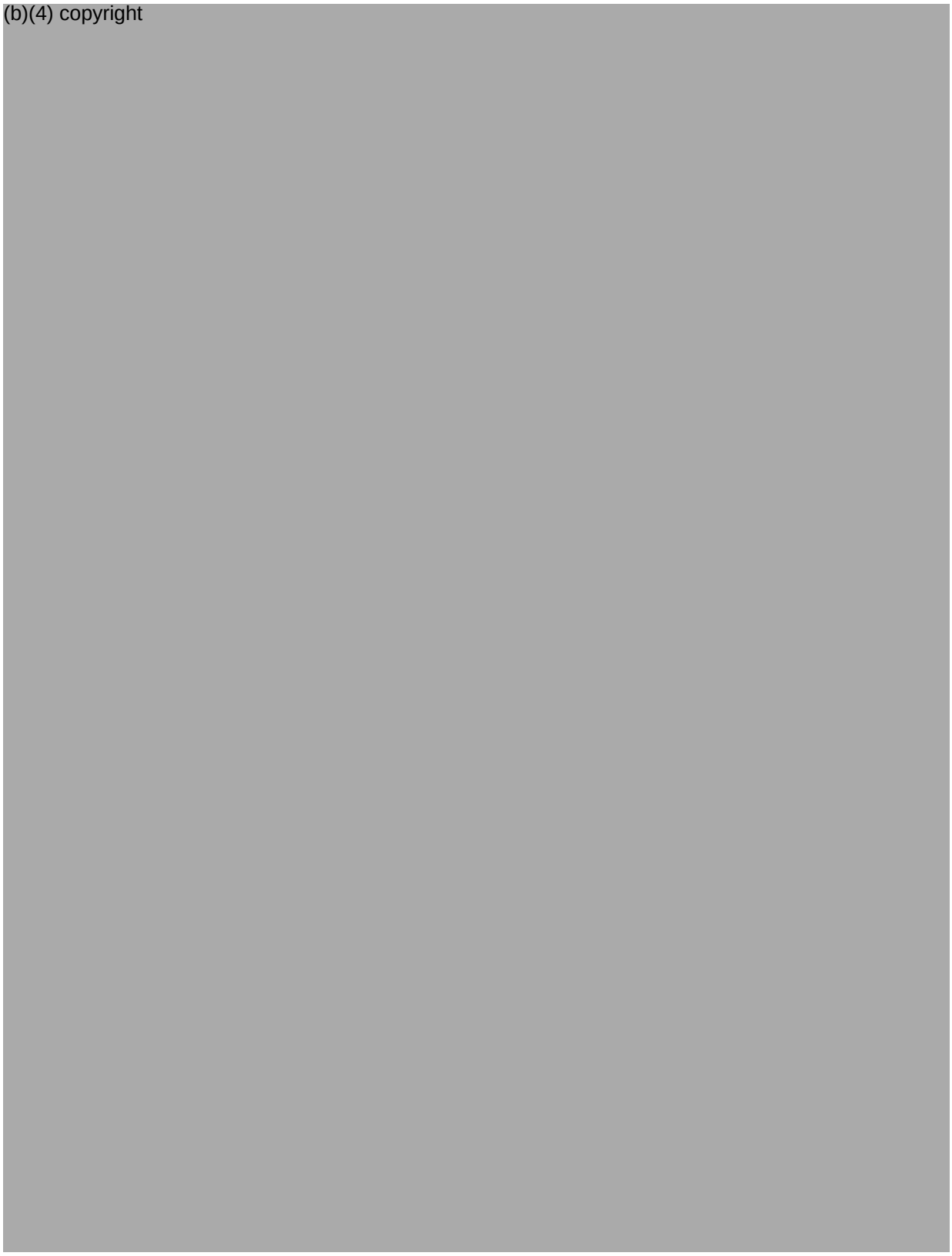
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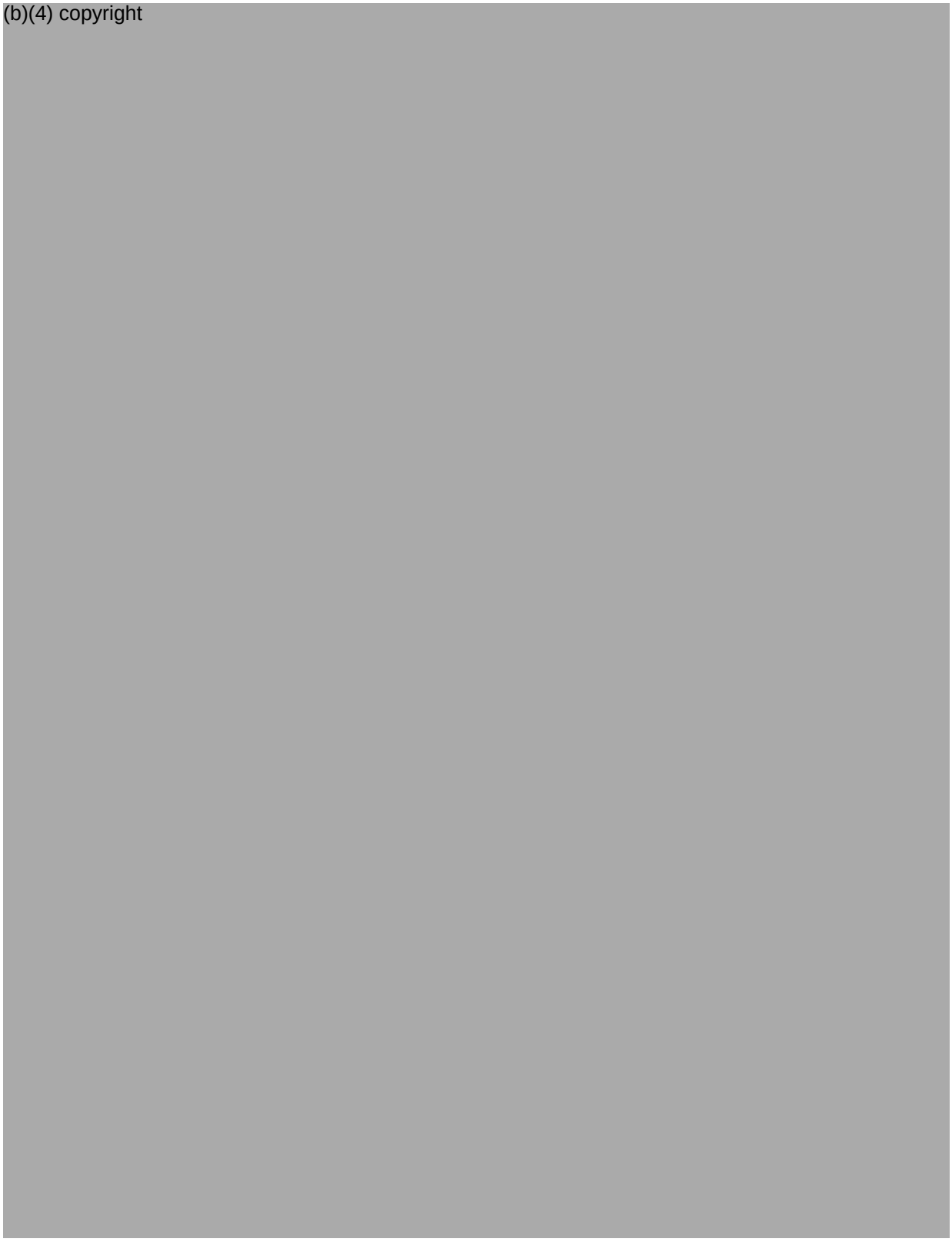
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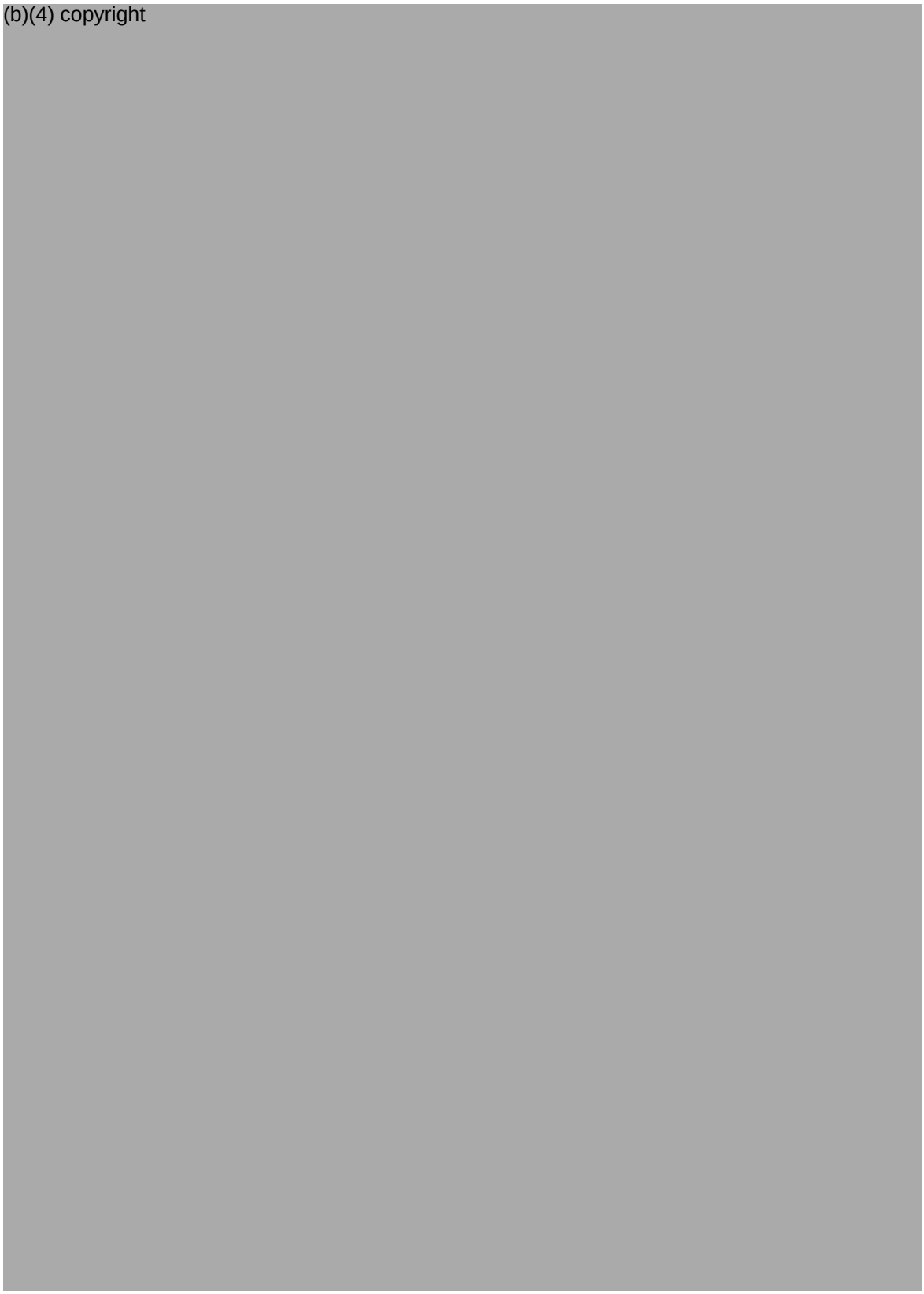
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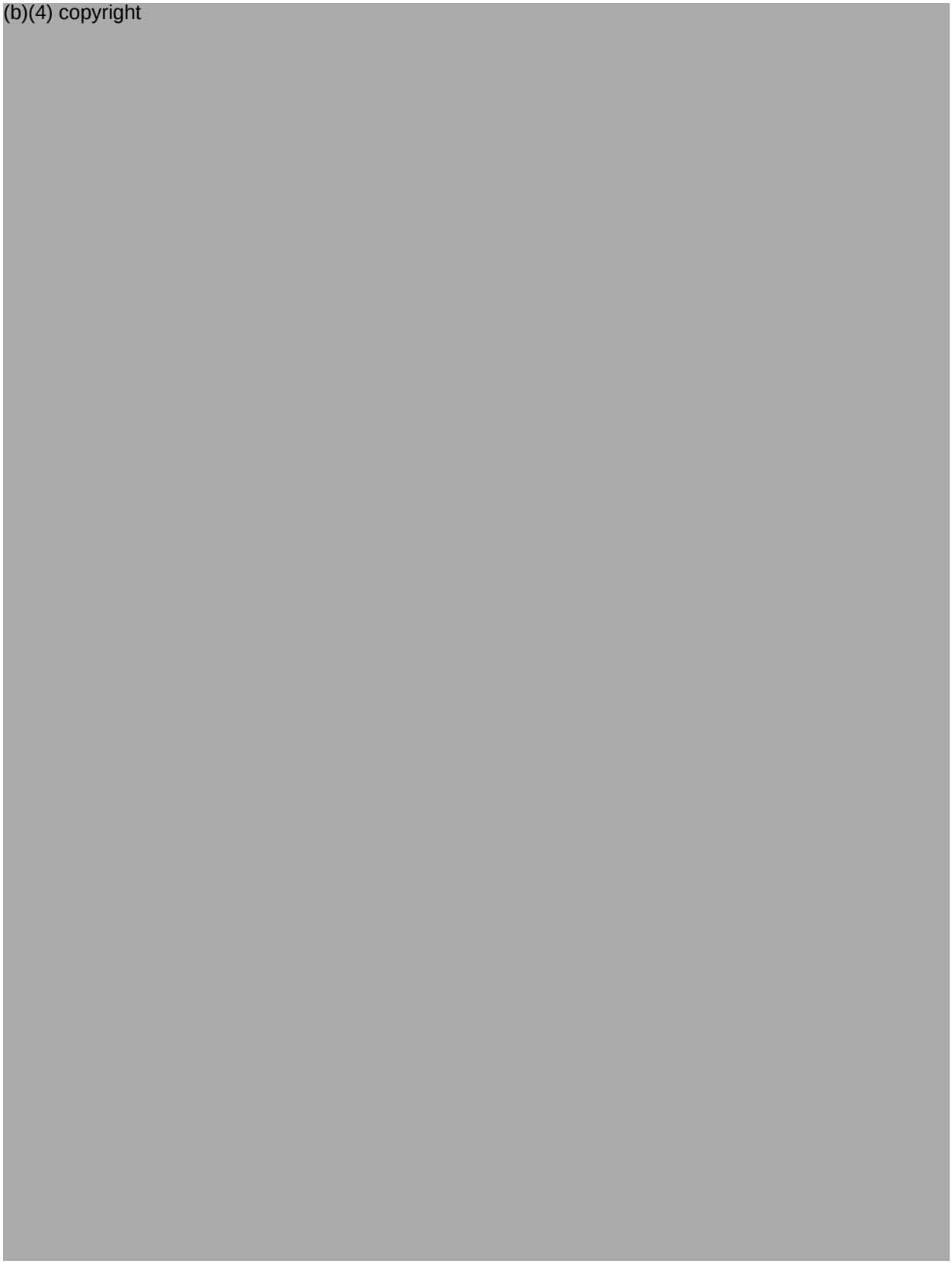
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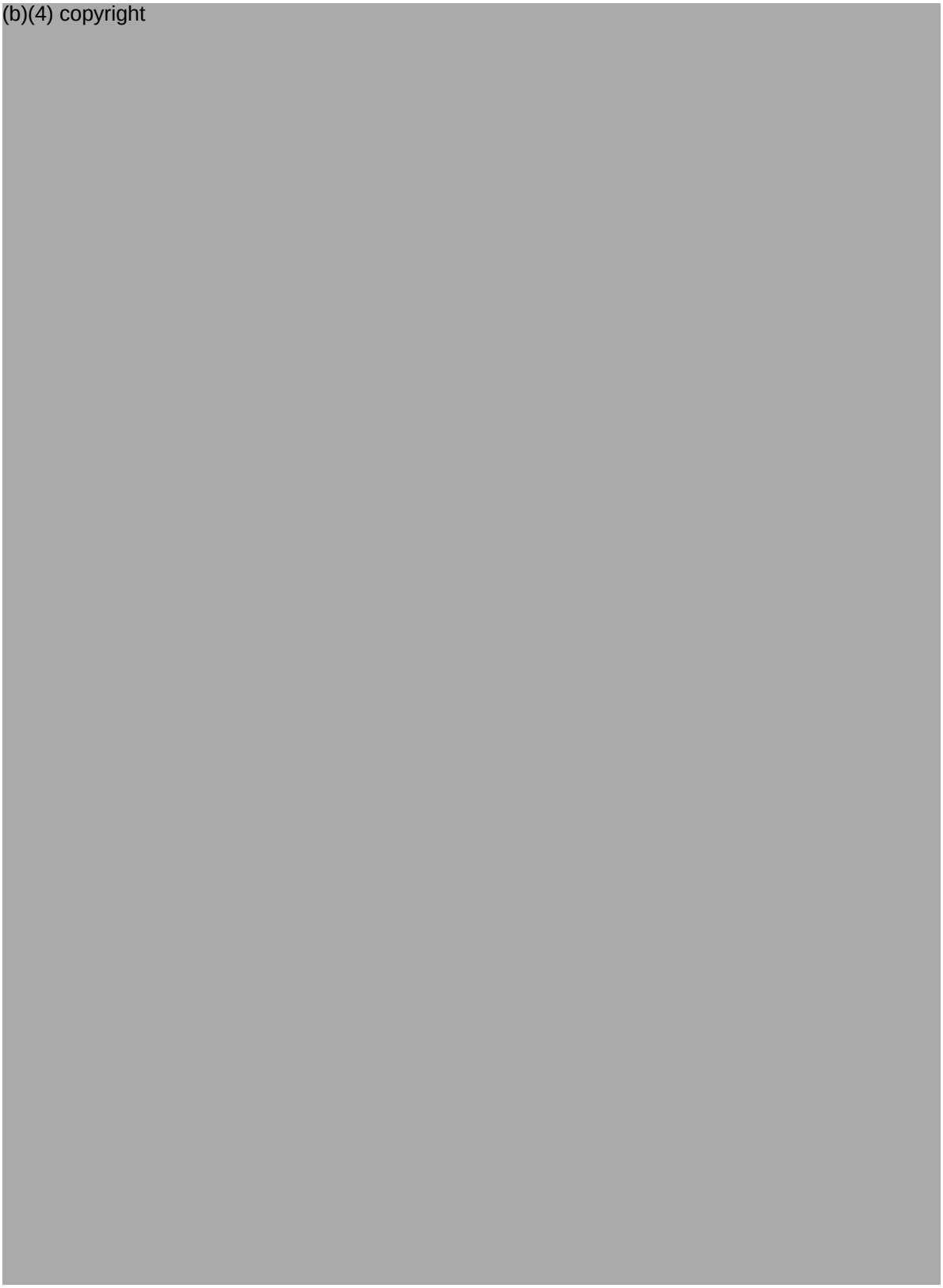
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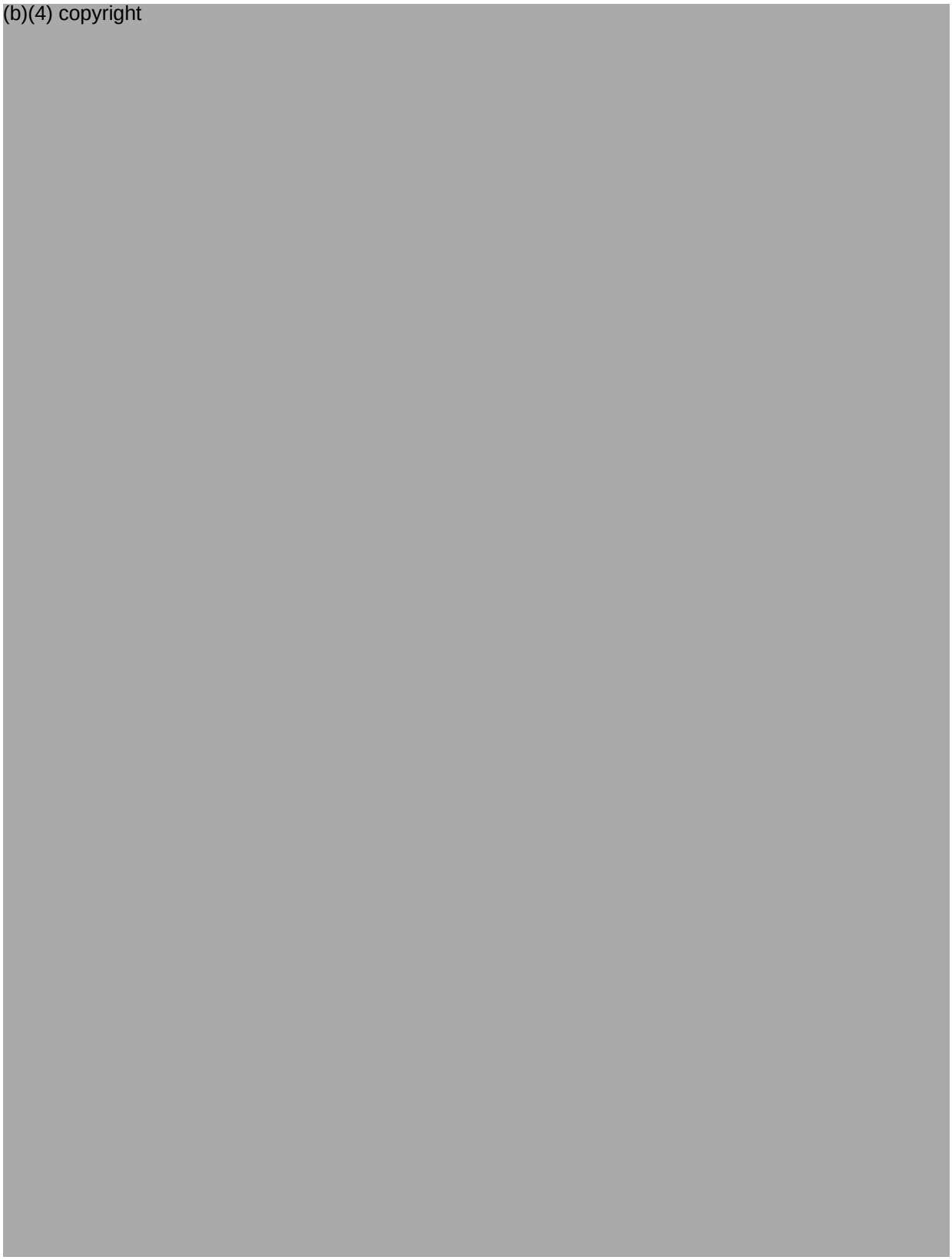
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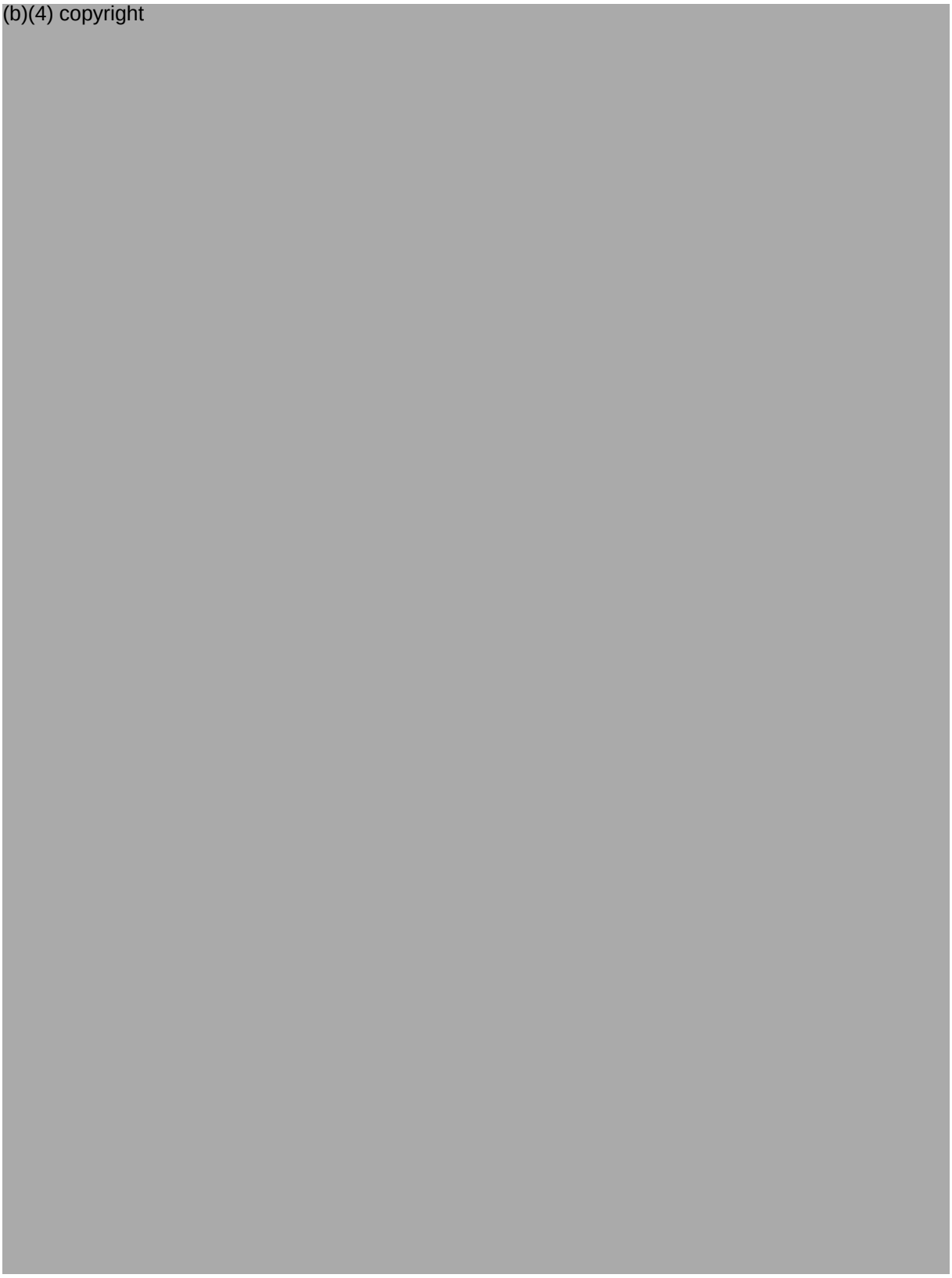
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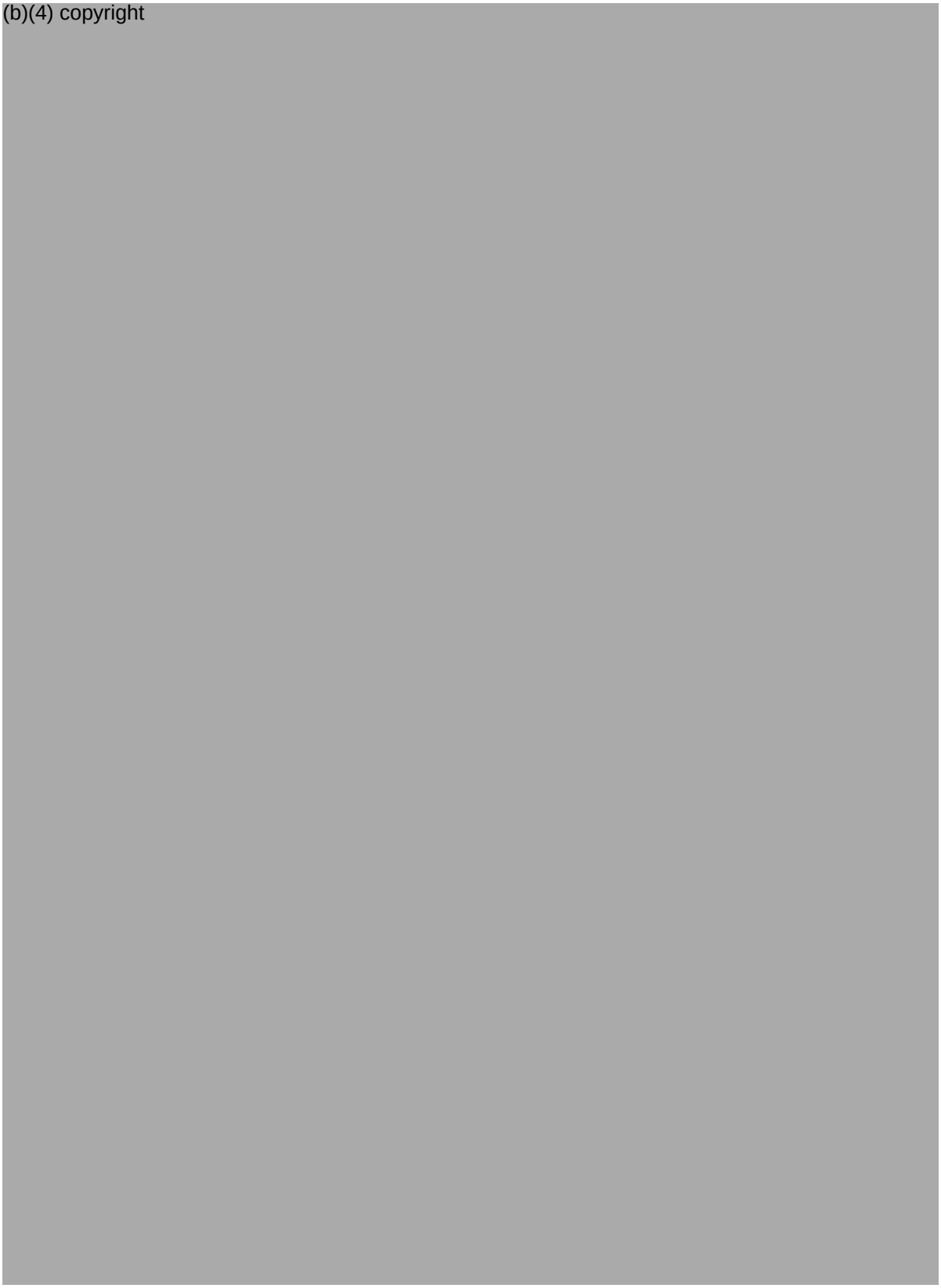
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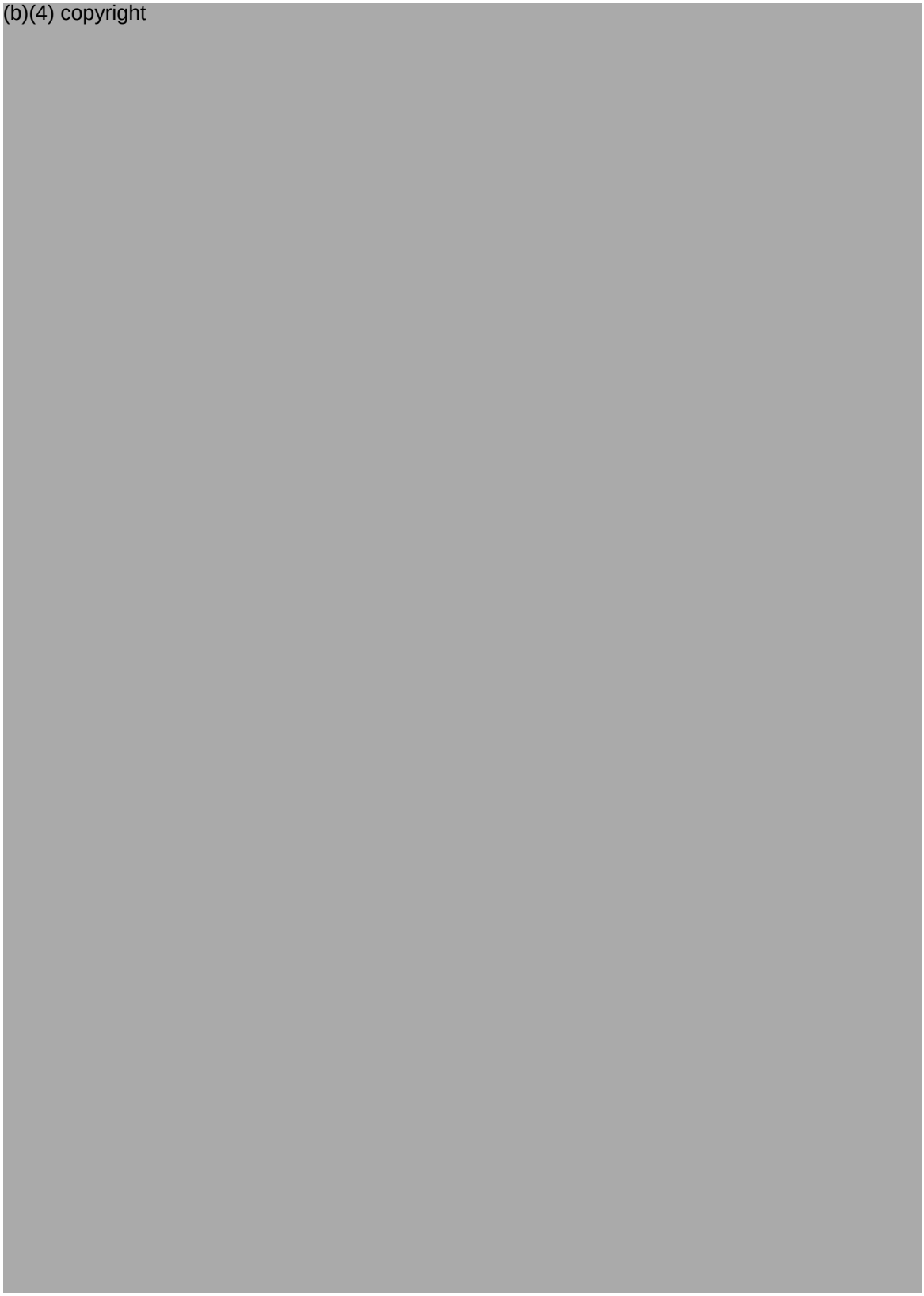
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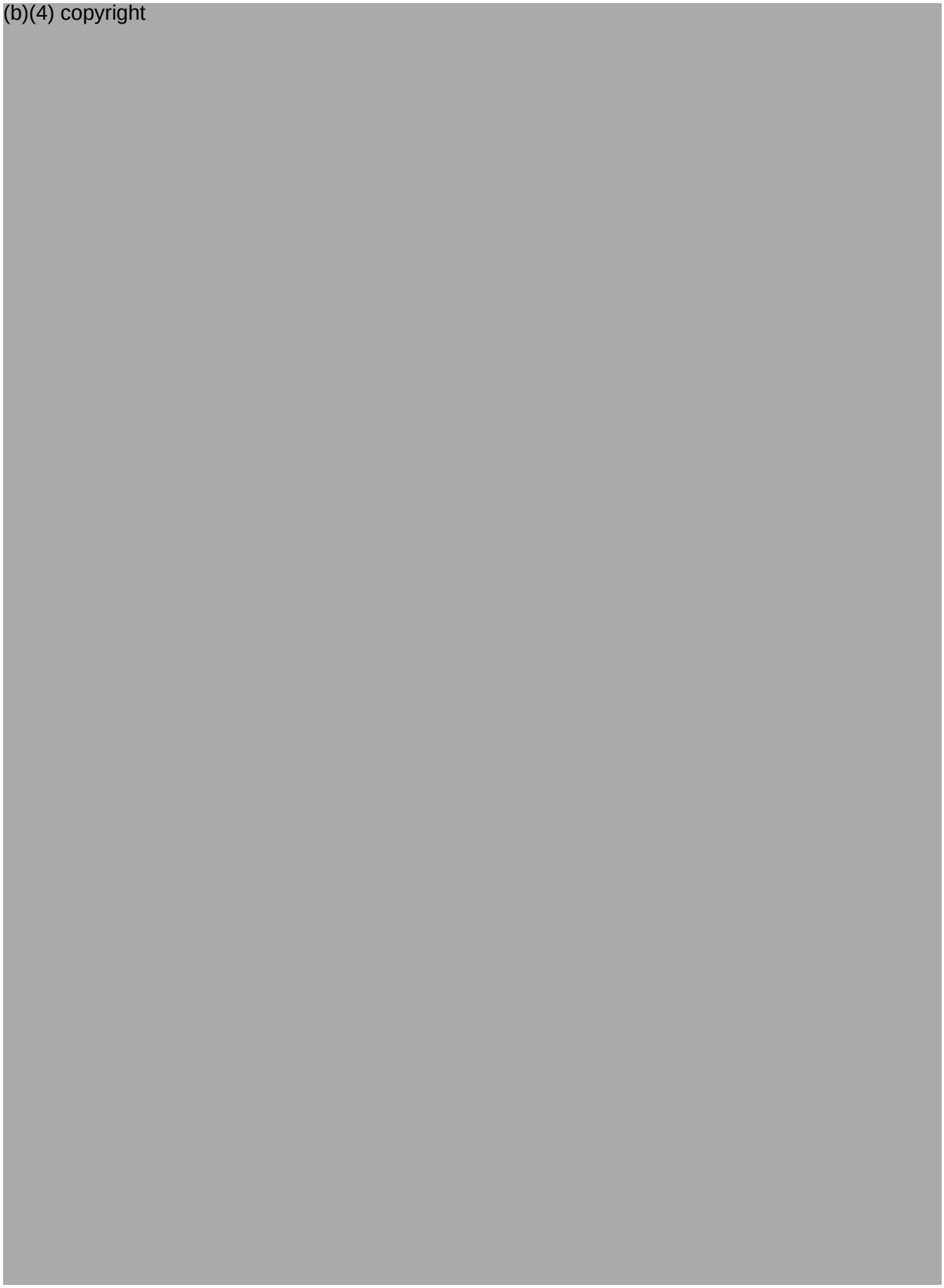
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U.S. Fish & Wildlife Service

ECOS

ECOS / Species Profile

Bull Trout (*Salvelinus confluentus*)

Range Information |Candidate Info |Federal Register |Recovery |Critical Habitat |SSA |Conservation Plans |Petitions |Biological Opinions |Life History

Taxonomy: View taxonomy in ITIS

Listing Status: Threatened and Experimental Population, Non-Essential

General Information

Bull trout (Salvelinus confluentus) are members of the family Salmonidae and are char native Washington, Oregon, Idaho, Nevada, Montana and western Canada. Compared to other salmonids, bull trout have more specific habitat requirements that appear to influence their distribution and abundance. They need cold water to survive, so they are seldom found in waters where temperatures exceed 59 to 64 degrees (F). They also require stable stream channels, clean spawning and rearing gravel, complex and diverse cover, and unblocked migratory corridors. Bull trout may be distinguished from brook trout (Salvelinus fontinalis) by several characteristics: spots never appear on the dorsal (back) fin, and the spots that rest on the fish's olive green to bronze back are pale yellow, orange or salmon-colored. The bull trout's tail is not deeply forked as is the case with lake trout (Salvelinus namaycush). Bull trout exhibit two forms: resident and migratory. Resident bull trout spend their entire lives in the same stream/creek. Migratory bull trout move to larger bodies of water to overwinter and then migrate back to smaller waters to reproduce. An anadromous form of bull trout also exists in the Coastal-Puget Sound population, which spawns in rivers and streams but rears young in the ocean. Resident and juvenile bull trout prey on invertebrates and small fish. Adult migratory bull trout primarily eat fish. Resident bull trout range up to 10 inches long and migratory forms may range up to 35 inches and up to 32 pounds. Bull trout are currently listed coterminously as a threatened species.

The species historical range included Alaska, California, Idaho, Montana, Nevada, Oregon, Washington. See below for information about where the species is known or believed to occur.

Population detail

The following populations are being monitored: Bull Trout

Current Listing Status Summary

Show 10 entries

Status	Date Listed	Lead Region	Where Listed
Threatened	06-10-1998	Pacific Region (Region 1)	U.S.A., conterminous, (lower 48 states) Additi
Experimental Population, Non-Essential	12-09-2009	Pacific Region (Region 1)	Clackamas River subbasin and the mainstem points of confluence with the Columbia River, i

Showing 1 to 2 of 2 entries ‹ Previous 1 Next ›

» Range Information

Current Range

U.S.A., conterminous, (lower 48 states)

Zoom in! Some species' locations may be small and hard to see from a wide perspective. To narrow-in on locations, check the state and county lists (below) and then use the zoom tool.

Want the FWS's current range for all species? Click here to download a zip file containing all individual shapefiles and metadata for all species.
* For consultation needs do not use only this current range map, please use IPaC.

- **U.S.A., conterminous, (lower 48 states)**

  Listing status: Threatened

  - **States/US Territories** in which this population is known to or is believed to occur: Idaho, Montana, Nevada, Oregon, Washington
  - **US Counties** in which this population is known to or is believed to occur: View All
  - **USFWS Refuges** in which this population is known to occur: Benton Lake Wetland Management District, Grays Harbor National Wildlife Refuge, Julia Butler Hansen Refuge for the Columbian White-Tailed Deer ...Show All Refuges

- **Clackamas River subbasin and the mainstem Willamette River, from Willamette Falls to its points of confluence with the Columbia River, including Multnomah Channel**

  Listing status: Experimental Population, Non-Essential

  - **States/US Territories** in which this population is known to or is believed to occur:
  - **US Counties** in which this population is known to or is believed to occur: View All

- **USFWS Refuges** in which this population is known to occur: Northwest Montana Wetland Management District-Flathead County

» Candidate Information

No Candidate information available for this species.

No Candidate Assessments available for this species.

Candidate Notice of Review Documents

Show 10 entries

Date	Citation Page	Title
10/30/2001	66 FR 54808 54832	ETWP; Review of Plant and Animal Species That Are Candidates Threatened,Annual Notice of Findings on Recycled Petitions, and Actions; Proposed Rule
10/25/1999	64 FR 57535 57547	Review of Plant and Animal Taxa That Are Candidates or Propose Annual Notice of Findings on Recycled Petitions; Annual Descripti
09/19/1997	62 FR 49398 49397	Review of Plant and Animal Taxa
02/28/1996	61 FR 7597 7613	ETWP; Review of Plant and Animal Taxa That Are Candidates for
11/15/1994	59 FR 58982 59028	ETWP; Animal Candidate Review for Listing as Endangered or Th
11/21/1991	56 FR 58804 58836	ETWP; Animal Candidate Review for Listing as Endangered or Th
01/06/1989	54 FR 554 579	ETWP; Animal Notice of Review; 54 FR 554 579

Showing 1 to 8 of 8 entries ‹ Previous 1 Next ›

No Uplisting Documents currently available for this species.

» Federal Register Documents

Federal Register Documents

Show 10 entries

Date	Citation Page	Title
07/24/2017	82 FR 34326 34329	Notice of Intent To Prepare a Draft Environmental Impact Statement for the Basin Habitat Conservation Plan in Oregon

09/30/2015	80 FR 58767 58768	Recovery Plan for the Coterminous United States Population of Bull Trout;
06/04/2015	80 FR 31916 31918	Endangered and Threatened Wildlife and Plants; Revised Draft Recovery P United States Population of Bull Trout and Draft Recovery Unit Implementa
09/04/2014	79 FR 52741 52743	ETWP; Revised Draft Recovery Plan for the Coterminous United States Po (Salvelinus confluentus)
03/06/2012	77 FR 13248 13251	5-Year Status Reviews of 46 Species in Idaho, Oregon, Washington, Neva and the Northern Mariana Islands:Notice of initiation of reviews; request fo

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» Species Status Assessments (SSAs)

Species Status Assessments (SSAs)

No Species Status Assessments (SSA's) are currently available for this species.

Special Rule Publications

Show 10 entries

Date	Citation Page	Title
06/21/2011	76 FR 35979 35995	Establishment of a Nonessential Experimental Population of Bull T
04/08/1999	64 FR 17110 17125	ETWP; Determination of Threatened Status for the Jarbidge River
06/10/1998	63 FR 31647 31674	ETWP; Determination of Threatened status for the Klamath River a of Bull Trout

Showing 1 to 3 of 3 entries

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» Recovery

- Species with Recovery Documents Data Explorer

Current Recovery Plan(s)

Show 10 entries

Date	Plan Stage	Recovery Plan	Implementation Status
09/30/2015	Final	St. Mary Recovery Unit Implementation Plan for Bull Trout (Salvelinus confluentus)	View Implementation Progress
09/30/2015	Final	Coastal Recovery Unit Implementation Plan for Bull Trout (Salvelinus confluentus)	View Implementation Progress
09/30/2015	Final	Upper Snake Recovery Unit Implementation Plan for Bull Trout (Salvelinus confluentus)	View Implementation Progress
09/30/2015	Final	Coastal Recovery Unit Implementation Plan for Bull Trout (Salvelinus confluentus)	View Implementation Progress
09/30/2015	Final	Klamath Recovery Unit Implementation Plan for Bull Trout (Salvelinus confluentus)	View Implementation Progress
09/30/2015	Final	Columbia Headwaters Recovery Unit Implementation Plan for Bull Trout (Salvelinus confluentus)	View Implementation Progress

Showing 1 to 8 of 8 entries

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Other Recovery Documents

Show 10 entries

Date	Citation Page	Title
09/30/2015	80 FR 58767 58768	Recovery Plan for the Coterminous United States Population of Bu Availability
06/04/2015	80 FR 31916 31918	Endangered and Threatened Wildlife and Plants; Revised Draft Re Coterminous United States Population of Bull Trout and Draft Rec Implementation Plans
09/04/2014	79 FR 52741 52743	ETWP; Revised Draft Recovery Plan for the Coterminous United S Bull Trout (Salvelinus confluentus)

03/06/2012	77 FR 13248 13251	5-Year Status Reviews of 46 Species in Idaho, Oregon, Washingtc Hawaii, Guam, and the Northern Mariana Islands:Notice of initiatic for information.
07/01/2004	69 FR 39951 39952	Draft Recovery Plan for the Jarbidge River Distinct Population Seg (Salvelinus confluentus)

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Five Year Reviews

Show 10 entries

Date	Title
11/13/2015	2015 Bull Trout 5-year Review
04/25/2008	Bull Trout Completed 5-yr Review

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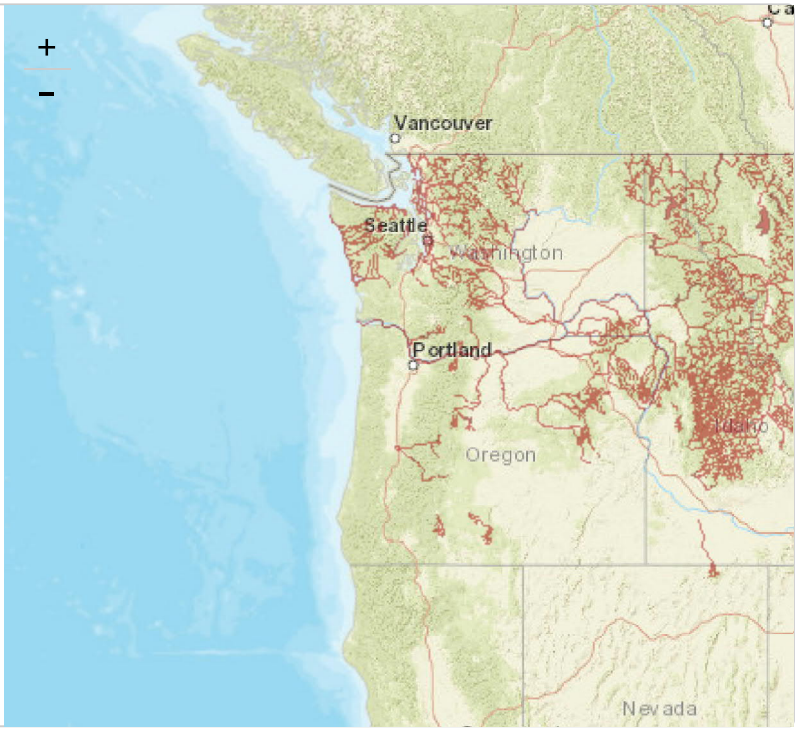
No Delisting Documents currently available for this species.

» Critical Habitat

Critical Habitat Spatial Extents

Population(s)

U.S.A., conterminous, lower 48 states



Critical Habitat Documents

Show 10 entries

Date	Citation Page	Title
10/18/2010	75 FR 63898 64070	Revised Designation of Critical Habitat for Bull Trout in the Coterm Rule

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To learn more about critical habitat please see http://ecos.fws.gov/crithab

» Conservation Plans

Habitat Conservation Plans (HCP) (learn more)

Show 10 entries

HCP Plan Summaries
West Fork Timber HCP, Amendment (Addition of Bull Trout and Lynx)
WDNR Forest Practices HCP
WDNR Forest Lands HCP, Amendment (Bull Trout Addition)
Washington Department of Natural Resources (WDNR) Low-effect HCP for Commercial Geoduck Fish
Storedahl's Daybreak Mine Expansion and Habitat Enhancement Project HCP
Stimson Lumber Company
Simpson Timber NW Operations (Green Diamond Resource Company)
Plum Creek Timber I-90 HCP, Amendment (Bull Trout Addition)
Plum Creek Timber I-90 HCP, Amendment (addition of Canada lynx and Puget Sound/Coastal DPS of

Showing 1 to 10 of 16 entries

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Candidate Conservation Agreements (CCA): (learn more)

Show 10 entries

CCA Plan Summaries
Conservation Agreement for bull trout in the South Fork of the Flathead River (Montana)

Showing 1 to 1 of 1 entries

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» Petitions

Show 10 entries

Petition Title	Date Received by the FWS	Where the species is believed to or known to occur	Petitioner Name	Requested Action	Pe Fi
Bull trout (Salvelinus confluentus)-Klamath R. & Columbia R. pops (Remanded finding)	11/03/1992	ID, MT, NV, OR, WA, United States		• Listing: Threatened	
Bull trout (Salvelinus confluentus)- Coastal/Puget Sound, Jarbridge River, & Saskatchewan pops (Remanded finding)	11/03/1992	ID, MT, NV, OR, WA, United States		• Listing: Threatened	
Bull trout (Salvelinus confluentus)- Coastal/Puget Sound, Jarbridge River, & Saskatchewan pops (Remanded finding)	11/03/1992	ID, MT, NV, OR, WA, United States		• Listing: Threatened	
Bull trout (Salvelinus confluentes)	11/03/1992	ID, MT, NV, OR, WA, United States	• Steve Kelly Alliance for the Wild	• APA: Designate Critical Habitat • Listing:	

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» Biological Opinions

Show 10 entries

BO date	Lead Office	Title	Activity Code	Project Type	Location

10/26/2020	Washington Fish and Wildlife Office	EWFO Mill Creek Flood Control Project Operations & Maintenance COE WW	01EWFW00-2018-F-1709	Dam - Operations - Federal, Stream/Waterbody - Channel/Diversion Structures	Walla Wal (WA)
08/05/2020	Idaho Fish and Wildlife Office	Pettit Lake Creek Weir Construction Project	01EIFW00-2020-F-1121	Stream/Waterbody - Mod - Fish Passage Barrier Constr	Blaine (ID
08/05/2020	Idaho Fish and Wildlife Office	Huckleberry Landscape Restoration Project	01EIFW00-2020-F-1101	Land Restoration / Enhancement - Forest	Adams (ID
07/31/2020	Washington	EWFO - Amended	01EWFW00-	Power Gen -	Pend Ore

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To see all Issued Biological Opinions please visit the report

» Life History

No Life History information has been entered into this system for this species.

» Other Resources

NatureServe Explorer Species Reports– NatureServe Explorer is a source for authoritative conservation information on more than 50,000 plants, animals and ecological communtities of the U.S and Canada. NatureServe Explorer provides in-depth information on rare and endangered species, but includes common plants and animals too. NatureServe Explorer is a product of NatureServe in collaboration with the Natural Heritage Network.

ITIS Reports– ITIS (the Integrated Taxonomic Information System) is a source for authoritative taxonomic information on plants, animals, fungi, and microbes of North America and the world.

FWS Digital Media Library -- The U.S. Fish and Wildlife Service's National Digital Library is a searchable collection of selected images, historical artifacts, audio clips, publications, and video." +